UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/528,348	11/07/2005	Gregory C. Roberts	15670-054US1 SD2002-186	5044

20985 7590 02/24/2009
FISH & RICHARDSON, PC
P.O. BOX 1022
MINNEAPOLIS, MN 55440-1022

EXAMINER	
PAJOOHI, TARA S	
ART UNIT	**PAPER NUMBER**
2886	
NOTIFICATION DATE	**DELIVERY MODE**
02/24/2009	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

PATDOCTC@fr.com

Office Action Summary	Application No. 10/528,348	Applicant(s) ROBERTS ET AL.	
	Examiner Tara S. Pajoohi	Art Unit 2886	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 December 2008*.

2a)☐ This action is FINAL. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-7,9-16 and 18-50* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-7, 9-16 and 18-50* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *3/17/05* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *12/4/2008*.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 12/4/2008 has been entered.

Response to Amendment

2. Acknowledgment is made to the amendment filed on 12/4/2008.

3. Currently, claims 1-7, 9-16 and 18-50 are pending in this application.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. **Claims 1-7, 9-16, 18, 22-30, 32-37, 39-41 and 43-50** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Flagan et al. (U.S. Patent No. 6,330,060)** in view of **Russell et al. (U.S. Patent No. 5,922,976).**

6. Considering **claim 1,** Flagan discloses (col. 3-4) a device (100) comprising: a cloud condensation nuclei chamber (120) having an input (110) to receive an aerosol flow (i.e., aerosol flow), and an output to export the aerosol flow (150), the cloud condensation nuclei chamber being

oriented vertically to receive the aerosol flow from the input at the top and export the aerosol flow from the output at the bottom to direct the aerosol flow in a downward direction along a direction of the gravity (col. 3, line 30) and a thermal control (140) engaged to the chamber (120) to control the temperature gradient of the chamber (col. 3, lines 7-11 and col. 4, lines 30-34).

Flagan fails to specifically disclose a region of supersaturation to grow cloud condensation nuclei and fails to specifically disclose a thermal control engaged to the chamber to produce a monotonic thermal profile and a monotonic temperature gradient in a steam-wise direction of the aerosol flow from the input to the output in the chamber.

Russell further discloses (col. 5-15) and shows in figures 1 and 12, a device, comprising: a cloud condensation nuclei chamber (162) having an input to receive an aerosol flow (i.e., the CNC receives and outputs aerosol particles, col. 6, lines 40-45), a region of supersaturation to grow cloud condensation nuclei (i.e., the sample is saturated in the CNC, Col. 10, lines 45-57), and an output to export the aerosol flow (i.e., the CNC receives and outputs aerosol particles, col. 6, lines 40-45), and a thermal control engaged to the chamber (i.e., the AMCAD controls the temperature in the CNC, col. 5, lines 10-18) to produce a monotonic thermal profile (see figure 12) and a monotonic temperature gradient in a steam-wise direction of the aerosol flow from the input to the output in the chamber (i.e., as the incoming aerosol sample changes, col. 5, lines 10-18 and figure 12).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have a region of supersaturation to grow cloud condensation nuclei and a thermal control engaged to the chamber to produce a monotonic thermal profile and a monotonic temperature gradient in a steam-wise direction of the aerosol flow from the input to the output in the chamber as taught by Russell in the system of Flagan, since Russell discloses it will provide for fast characterization of fine particle size distributions in a pressure-changing environment.

7. Considering **claims 2-4, 28-30 and 45-46,** Flagan fails to specifically disclose the temperature of the chamber monotonically increases/decreases, linearly increases/decreases, or nonlinearly increases/decreases along the aerosol flow.

Russell discloses (col. 18, lines 13-60) and shows in figure 12, the temperature of the chamber monotonically increases/decreases, linearly increases/decreases, or nonlinearly increases/decreases along the aerosol flow.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made for the temperature of the chamber monotonically increases/decreases, linearly increases/decreases, or nonlinearly increases/decreases along the aerosol flow, since Russell discloses that the temperature must be adjusted for based on particle size.

8. Considering **claim 5,** Flagan discloses (col. 3-4) a flow control mechanism (114) to split an air sample flow (col. 4, line 62) into the aerosol flow (112) and a sheath flow (114), wherein the sheath flow is directed along inner surfaces of said chamber to keep the aerosol flow away from the surfaces.

9. Considering **claim 6,** Flagan discloses (col. 4, lines 45-59) controlling the aerosol flow and the sheath flow and that the sheath flow has a sheath flow rate higher (i.e., sheath flow increases) than a flow rate of the aerosol flow.

10. Considering **claim 7,** Flagan discloses the column is cylindrically shaped to direct the aerosol flow along an axis of the cylinder.

11. Considering **claims 9 and 16,** Flagan disclose (col. 3-4) a cloud condensation nuclei measuring apparatus comprising: a chamber (120) to receive an air sample (i.e., aerosol) from a selected sampling location and to keep said air sample to flow downward along a direction of the gravity in a region of supersaturation within a specified range, a heating system (140, temperature

controller) and an optical particle counter (130) coupled to said chamber to measure particles in said air sample output by said chamber and to provide a count indicative of particles within a selected size range; and

Flagan fails to specifically disclose the air sample to flows downward into a region of supersaturation within a specified range. Flagan also fails to specifically disclose a heating system providing linearly increasing temperature gradient along the axis of the chamber in the direction of the flow and wherein the heating system is configured to produce a monotonic thermal profile in a stream-wise direction of the flow.

Russell further discloses (col. 5-15) and shows in figures 1 and 12, a device, comprising: a cloud condensation nuclei chamber (162) having an input to receive an aerosol flow (i.e., the CNC receives and outputs aerosol particles, col. 6, lines 40-45), a region of supersaturation to grow cloud condensation nuclei (i.e., the sample is saturated in the CNC, Col. 10, lines 45-57), and an output to export the aerosol flow (i.e., the CNC receives and outputs aerosol particles, col. 6, lines 40-45), and a thermal control engaged to the chamber (i.e., the AMCAD controls the temperature in the CNC, col. 5, lines 10-18) to produce a monotonic thermal profile (see figure 12) and a monotonic temperature gradient in a steam-wise direction of the aerosol flow from the input to the output in the chamber (i.e., as the incoming aerosol sample changes, col. 5, lines 10-18 and figure 12). Russell further discloses (col. 18, lines 13-60) and shows in figure 12, the temperature of the chamber monotonically increases, linearly increases, or nonlinearly increases along the aerosol flow.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have a region of supersaturation to grow cloud condensation nuclei and a thermal control engaged to the chamber to produce a monotonic thermal profile and a monotonic temperature gradient in a steam-wise direction of the aerosol flow from the input to the output in

the chamber as taught by Russell in the system of Flagan, since Russell discloses it will provide for fast characterization of fine particle size distributions in a pressure-changing environment. It would have been further obvious to one having ordinary skill in the art at the time the invention was made for the temperature of the chamber monotonically increases, linearly increases, or nonlinearly increases along the aerosol flow, since Russell discloses that the temperature must be adjusted for based on particle size.

12. Considering **claim 10,** Flagan discloses (col. 4, lines 36-59) a flow control mechanism (mass flow controller, 114) to provide a sheath flow (114) around the air sample (112) in said chamber (120) and to keep the air sample away from side walls of said chamber.

13. Considering **claim 11,** Flagan discloses (col. 4, lines 36-59) controlling a sheath flow (114) around the air sample (112) but fails to specifically disclose the ratio of a flow rate of the sheath flow over a flow rate of the air sample is controlled between about 5 and 20.

However it would have been obvious to one having ordinary skill in the art at the time the invention was made to control the rate between about 5 and 20, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art. In re Aller, 105 USPQ 233. It would have been further obvious in order to control the flow ratio in order to have a more accurate and controlled counting of the particles through the column.

14. Considering **claim 12,** Flagan discloses (col. 3, line 45 – col. 4, line 5) a heating element (hot column segment (220)) to heat the sheath flow at a temperature above a temperature of an end of said chamber receives the air sample.

15. Considering **claim 13,** Flagan discloses (col. 3, lines 50-51) said chamber has a wetted inner surface (i.e., side wall of the flow channel is wetted).

16. Considering **claim 14,** Flagan discloses (col. 3, lines 50-54) said chamber has a layer of a filter paper on the wetted inner surface (i.e., filter paper lines the side walls of the wetted inner walls of the flow channel).

17. Considering **claim 15,** Flagan discloses (col. 3, lines 38-54) porous column (applicants' chamber) segments but fails to specifically disclose the chamber has a layer of a porous ceramic material on the wetted inner surface.

However it would have been obvious to one having ordinary skill in the art at the time the invention was made to have a layer of porous ceramic material on the wetted inner surface, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416. It would have been further obvious to have a layer of porous ceramic material on the wetted inner surface in order to provide for continuous flow.

18. Considering **claim 18,** Flagan fails to disclose the apparatus with a second chamber, second heating system and second particle counter.

However in the same field of endeavor, Russell discloses (col. 6) a cloud condensation nuclei measuring apparatus further comprising: a second chamber to receive a second chamber to receive a second air sample and to keep said second air sample in a region of supersaturation within a specified range; a second heating system providing an increasing temperature gradient along the axis of said camber in the direction of flow; and a second particle counter to measure particles in said second air sample output from said second chamber and to provide a count indicative of particles within a selected size range.

It would have been obvious to one having ordinary skill in the art to have a second chamber, a second heating system and a second particle counter as taught by Russell, since such a

modification to the cloud condensation nuclei measuring apparatus would increase the spatial resolution of the measuring apparatus (col. 6, line 61-63).

19. Considering **claim 22,** Flagan discloses (col. 3-4) a method for conditioning a sample in a cloud condensation nuclei measurement apparatus, comprising: subjecting a sample (112) passing through a column (120) and subjecting said sample to a temperature gradient in a direction of sample flow (i.e., temperature change between the input and the output of the column) but fails to specifically discloses the increasing temperature in the direct of sample flow and a monotonic thermal profile in a stream-wise direction of the sample flow to produce a substantially constant supersaturation.

Russell further discloses (col. 5-15) and shows in figures 1 and 12, a device, comprising: a cloud condensation nuclei chamber (162) having an input to receive an aerosol flow (i.e., the CNC receives and outputs aerosol particles, col. 6, lines 40-45), a region of supersaturation to grow cloud condensation nuclei (i.e., the sample is saturated in the CNC, Col. 10, lines 45-57), and an output to export the aerosol flow (i.e., the CNC receives and outputs aerosol particles, col. 6, lines 40-45), and a thermal control engaged to the chamber (i.e., the AMCAD controls the temperature in the CNC, col. 5, lines 10-18) to produce a monotonic thermal profile (see figure 12) and a monotonic temperature gradient in a steam-wise direction of the aerosol flow from the input to the output in the chamber (i.e., as the incoming aerosol sample changes, col. 5, lines 10-18 and figure 12).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have a region of supersaturation to grow cloud condensation nuclei and a thermal control engaged to the chamber to produce a monotonic thermal profile and a monotonic temperature gradient in a steam-wise direction of the aerosol flow from the input to the output in

the chamber as taught by Russell in the system of Flagan, since Russell discloses it will provide for fast characterization of fine particle size distributions in a pressure-changing environment.

20. Considering **claim 23,** Flagan discloses (col. 4, lines 46-59) using a sheath flow (114) around the sample flow (112) to keep the sample flow from inner surfaces of the column (120).

21. Regarding **claim 24,** Flagan discloses (col. 3, lines 50-51) said chamber has a wetted inner surface (i.e., side wall of the flow channel is wetted).

22. Considering **claim 25,** Flagan discloses (col. 3-4) a method, comprising: directing an aerosol flow (112) through a cloud condensation nuclei chamber (120) to grow particles due to condensation from supersaturation and controlling a temperature profile (140) of the chamber along the aerosol flow

Flagan fails to specifically disclose growing particles due to a condensation from supersaturation and producing a nearly constant supersaturation along the chamber.

Russell further discloses (col. 5-15) and shows in figures 1 and 12, a device, comprising: a cloud condensation nuclei chamber (162) having an input to receive an aerosol flow (i.e., the CNC receives and outputs aerosol particles, col. 6, lines 40-45), a region of supersaturation to grow cloud condensation nuclei (i.e., the sample is saturated in the CNC, Col. 10, lines 45-57), and an output to export the aerosol flow (i.e., the CNC receives and outputs aerosol particles, col. 6, lines 40-45), and a thermal control engaged to the chamber (i.e., the AMCAD controls the temperature in the CNC, col. 5, lines 10-18) to produce a monotonic thermal profile (see figure 12) and a monotonic temperature gradient in a steam-wise direction of the aerosol flow from the input to the output in the chamber (i.e., as the incoming aerosol sample changes, col. 5, lines 10-18 and figure 12).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have a region of supersaturation to grow cloud condensation nuclei and a thermal

control engaged to the chamber to produce a monotonic thermal profile and a monotonic temperature gradient in a steam-wise direction of the aerosol flow from the input to the output in the chamber as taught by Russell in the system of Flagan, since Russell discloses it will provide for fast characterization of fine particle size distributions in a pressure-changing environment.

23. Regarding **claim 26,** Flagan discloses (col. 4, lines 46-59) providing a sheath flow (114) around the aerosol flow (112) to reduce particle loss caused by contact of particles in the aerosol flow and inner surface of the chamber (i.e., controlling filtering of particles).

24. Regarding **claim 27,** Flagan fails to specifically disclose temperature of the chamber increases monotonically along the direction of the aerosol flow.

Russell discloses (col. 18, lines 13-60) and shows in figure 12, the temperature of the chamber monotonically increases along the aerosol flow.

However, it would have been obvious to one having ordinary skill in the art at the time the invention was made for the temperature of the chamber monotonically increases/decreases, linearly increases/decreases, or nonlinearly increases/decreases along the aerosol flow, since Russell discloses that the temperature must be adjusted for based on particle size.

25. Considering **claim 35,** Flagan discloses (col. 3, lines 3-37) the aerosol flow includes a gas that is different from air (i.e., water droplets).

26. Considering **claim 36,** Flagan discloses (col. 3, lines 50-54) a mechanism (170) to supply a liquid to wet an inner wall of the chamber.

27. Considering **claim 37,** Flagan discloses (col. 3, lines 53-54) the liquid is different from water (i.e., filter paper).

28. Considering **claim 39,** Flagan discloses (col. 3, lines 28-54) the inner wall of the chamber, which is wetted by the liquid, is made from alumina bisque (i.e., aluminum).

29. Considering **claim 40,** the modified system of Flagan discloses (col. 3, lines 50-54 of Flagan) the inner wall surface includes filter paper to assist the wetting of the inner wall surface but fails to specifically disclose the inner wall surface includes gun-barrel-type grooves.

However it would have been obvious to one having ordinary skill in the art at the time the invention was made to find the most appropriate material such as filter paper or creating a gun-barrel-type groove, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416. It would have been further obvious since it will provide a frictional resistance during the application of the wetting process and thus hold the water to the side wall more efficiently.

30. Considering **claim 41,** Flagan discloses (col. 3, line 55 - col. 4, line 5) a feedback control (140) that controls the temperature of the chamber.

31. Considering **claim 43,** Flagan discloses a mechanism to generate cloud condensation nuclei spectra (i.e., CCN spectra) but fails to specifically disclose the mechanism modifies the monotonic thermal gradient profile in the stream-wise direction of the aerosol flow.

Russell discloses a mechanism (i.e., the AMCAD controls the temperature in the CNC, col. 5, lines 10-18) that modifies the monotonic thermal gradient profile in the stream-wise direction of the aerosol flow (i.e., as the incoming aerosol sample changes, col. 5, lines 10-18 and figure 12).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have to modify the monotonic thermal gradient profile as taught by Russell in the system of Flagan, since Russell discloses it will provide for fast characterization of fine particle size distributions in a pressure-changing environment.

32. Considering **claim 44,** Flagan discloses (col. 4, lines 35-60) a mechanism (152) for controlling sizes of particles of the aerosol flow in the chamber (i.e., controls the total flow) to control the supersaturation profile but fails to specifically disclose it is to increase a size threshold for particle counting at a low supersaturation and to decrease the size threshold at a high supersaturation.

However, it would have been an obvious matter of design choice to increase the size threshold when there is a low supersaturation and decrease the size threshold at a high supersaturation in order to maintain the supersaturation profile in the column, since Flagan discloses (col. 5, lines 3-16) that it will improve the accuracy or particle counting.

33. Considering **claim 47,** the modified system of Flagan fails to specifically disclose the first and second chambers have different lengths.

However since both Flagan and Russell disclose that chamber length can be varied and chosen based upon the desired outcome, it would have been an obvious matter of design choice in order to provide different flow rates for the aerosol particles.

34. Considering **claims 32-34 and 48,** Flagan fails to specifically disclose the first and second chambers have different temperature gradients.

However since both Flagan and Russell disclose there is temperature control among the chamber, it would have been an obvious matter of design choice to have the chambers different temperature gradients in order to sample and filter different aerosol particles.

Flagan also fails to specifically disclose the temperature of the chamber monotonically increases/decreases, linearly increases/decreases, or nonlinearly increases/decreases along the aerosol flow or has a constant temperature with a zero thermal gradient.

Russell discloses (col. 18, lines 13-60) and shows in figure 12, the temperature of the chamber monotonically increases/decreases, linearly increases/decreases, or nonlinearly increases/decreases along the aerosol flow.

However, it would have been obvious to one having ordinary skill in the art at the time the invention was made for the temperature of the chamber monotonically increases/decreases, linearly increases/decreases, or nonlinearly increases/decreases along the aerosol flow, since Russell discloses that the temperature must be adjusted for based on particle size.

35. Considering **claim 49,** Flagan fails to specifically disclose the first and second chamber have different flow rates.

Russell discloses (col. 6, lines 13-45) the first and second chambers (124 and 126) have different flow rates.

It would have been obvious to one having ordinary skill in the art at the time the invention was made for the first and second chambers to have different flow rates as taught by Russell in the system of Flagan, since Russell discloses (col. 6, lines 1-45) it will allow for more control of the sampling of the aerosol particles.

36. Considering **claim 50,** Flagan fails to specifically disclose the first and second chambers have different internal pressures.

Russell discloses (col. 6, lines 13-45) the first and second chambers (124 and 126) have different internal pressures.

It would have been obvious to one having ordinary skill in the art at the time the invention was made for the first and second chambers to have different internal pressures as taught by Russell in the system of Flagan, since Russell discloses (col. 6, lines 1-45) it will allow for more control of the sampling of the aerosol particles.

37. **Claims 19-21, 31, 38 and 42** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Flagan et al. (U.S. Patent No. 6,330,060)** in view of **Russell et al. (U.S. Patent No. 5,922,976)** and further in view of **Hollander et al. (U.S. Patent No. 5,239,356).**

38. Considering **claim 19,** Flagan discloses (col. 3, line 45 – col. 4, line 5) a thermal gradient diffusion chamber (thermal conductive tube, 230) for inclusion in a cloud condensation nuclei measurement apparatus comprising a cloud condensation nuclei column (120) that forms a hollow channel to direct a received aerosol flow (i.e., cylindrical shaped column to direct the flow), a flow control mechanism (114) to split an air sample flow (col. 4, line 62) into the aerosol flow along a first path and a sheath flow along a second, different path and comprising a particle filter in the sheath flow to remove particles in the sheath flow (i.e., particle filter, col. 4, lines 46-59), the flow control mechanism (114) coupled to the cloud condensation nuclei column to direct the sheath flow to flow along inner surfaces of the cloud condensation nuclei column to keep the aerosol flow away from the inner surfaces, a heat source (22) to create an increasing temperature gradient in the direct of flow of the aerosol flow in the chamber, and a particle counter (300) coupled to the cloud condensation nuclei column to measure particles in the air sample output by the cloud condensation nuclei column and to provide a count indicative of particles within a selected size range.

The modified system of Flagan fails to specifically disclose a humidifier in the sheath flow to provide a controlled humidity in the sheath flow.

In a condensation nucleus counter, Hollander discloses (col. 3-4) using a humidifier to provide controlled humidity of the sheath flow.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to control the humidity of the sheath flow as taught by Hollander in the modified system

of Flagan, since Hollander teaches (col. 2, line 60 – col. 3, line 8) this allows for mass flows of different sizes can be taken.

39. Considering **claim 20,** Flagan discloses (col. 3, lines 50-51) said chamber has a wetted inner surface (i.e., side wall of the flow channel is wetted).

40. Considering **claim 21,** Flagan fails to specifically disclose the temperature along the axis of the chamber linearly increases

Russell discloses (col. 18, lines 13-60) and shows in figure 12, the temperature of the chamber linearly increases along the aerosol flow.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made for the temperature of the chamber linearly increases along the aerosol flow, since Russell discloses that the temperature must be adjusted for based on particle size.

41. Considering **claim 31,** the modified system of Flagan discloses (col. 1, lines 38-54 of Flagan) that various diameters, including the wall thickness, of the CCN chambers are chosen based on the desired end result of the condensation growth. The modified system of Flagan also discloses (col. 3, lines 38-45 of Flagan) the thickness of the wall can be approximately 5 mm.

The modified system of Flagan fails to specifically disclose that the wall thickness is sufficiently large to make heat transfer in the chamber wall along the stream-wise direction greater than heat losses to the aerosol flow and to surrounding of the chamber.

In a condensation nucleus counter, Hollander discloses (col. 2, lines 9-21) that it is advantageous for the wall thickness to be about 3-15 mm which meets the limitation of 8 mm which is disclosed by the applicant's own disclosure as a chamber wall thickness having a sufficiently large diameter.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have a chamber wall thickness of a sufficiently large diameter as taught by Hollander in the modified system of Flagan, since Hollander discloses (col. 1, lines 50-57) it provides for a cost effective CCN counter which permits the measuring of larger mass flows and the carrying-out of a measurement simultaneously at various points with relatively low expenditures with respect to equipment.

42. Considering **claim 38,** the modified system of Flagan fails to specifically disclose the inner wall of the chamber, which is wetted by the liquid, is made from a porous ceramic material.

In a condensation nucleus counter, Hollander discloses (col. 2, lines 9-21) the chamber is a porous ceramic material

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have a chamber made from a porous ceramic material as taught by Hollander in the modified system of Flagan, since Hollander discloses (col. 1, lines 50-57) it provides for a cost effective CCN counter which permits the measuring of larger mass flows and the carrying-out of a measurement simultaneously at various points with relatively low expenditures with respect to equipment and (col. 2, lines 9-21) that it provides for aerodynamic separation of the individual aerosol flows.

43. Considering **claim 42,** the modified system of Flagan discloses (col. 3, lines 50-54 of Flagan) a mechanism (170) to supply a liquid to wet an inner wall of the chamber but fails to specifically disclose a humidifier in the path of the sheath flow to provide a controlled humidity in the sheath flow.

In a condensation nucleus counter, Hollander discloses (col. 3-4) using a humidifier to provide controlled humidity of the sheath flow.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to control the humidity of the sheath flow as taught by Hollander in the modified system of Flagan, since Hollander teaches (col. 2, line 60 – col. 3, line 8) this allows for mass flows of different sizes can be taken.

Response to Arguments

44. Applicant's arguments with respect to claims 1-7, 9-16 and 18-50 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

45. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tara S. Pajoohi whose telephone number is (571)272-9785. The examiner can normally be reached on Monday - Thursday 9:00 a.m. - 5:00 p.m., EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tarifur R. Chowdhury can be reached on 571-272-2287. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Tara S. Pajoohi
Patent Examiner

TSP
/TARIFUR R CHOWDHURY/
Supervisory Patent Examiner, Art Unit 2886